

## On the valid name of the lesser New Zealand short-tailed bat (Mammalia: Chiroptera)

Gregory C. Mayer, John A. W. Kirsch, James M. Hutcheon, François-Joseph Lapointe,  
and Jacinthe Gingras

(GCM) Department of Biological Sciences, University of Wisconsin-Parkside, Kenosha, Wisconsin 53141, U.S.A.; (GCM, JAWK, JMH) The University of Wisconsin Zoological Museum, 250 North Mills St., Madison, Wisconsin 53706, U.S.A.; (FJL, JG) Département de sciences biologiques, Université de Montréal, Montréal, Québec H3C 3J7

*Abstract.*—The lesser New Zealand short-tailed bat, sometimes known as *Mystacina tuberculata* Gray, 1843 was, for 14 years after its description, confounded with the New Zealand long-tailed bat, *Vespertilio* (now *Chalinolobus*) *tuberculatus*. This confusion can be traced to Gray's account, in which he used the name *Vespertilio tuberculatus*, attributing it to G. Forster, but also proposed the new genus *Mystacina* to receive the species. Although Gray did not make available two species-group names, two interpretations of his actions are possible, depending on who is considered to be the author of the name *tuberculatus*. If the author is Gray, *Mystacina tuberculata* Gray is composite, in which case the name must be settled on a part of that composite. If the author is G. Forster, Gray's generic name *Mystacina* is based on a misidentified type species, and there is no "*Mystacina tuberculata* Gray". In that case, the specific name must be replaced by the first available name, which is *velutina* Hutton, 1872, and the current usage of *Mystacina* may be preserved by choosing the zoological species before Gray as its type species. We recommend this course of action because G. Forster is properly the author of *Vespertilio tuberculatus*, and because thereby familiar usage of *Mystacina* and *Mystacinidae*, and current subspecific classification of *Mystacina*, are preserved. The valid name of the lesser New Zealand short-tailed bat is therefore *Mystacina velutina* Hutton, 1872, and we select Hutton's specimen from the Hutt Valley (near Wellington, North Island, New Zealand) as its lectotype.

*Résumé.*—Durant les 14 années qui ont suivi sa description en 1843, la petite chauve-souris à queue courte de Nouvelle-Zélande, *Mystacina tuberculata* Gray, a été confondue avec la chauve-souris à queue longue de Nouvelle-Zélande *Vespertilio* (maintenant *Chalinolobus*) *tuberculatus*, ce dernier nom lui ayant été attribué soit par Gray, G. Forster ou J. R. Forster. La confusion remonte au compte-rendu initial de Gray dans lequel il utilise le nom *Vespertilio tuberculatus* qu'il attribue à G. Forster. Dans ce même compte-rendu, Gray propose le nouveau genre *Mystacina* pour y classer l'espèce *V. tuberculatus*. Si les travaux de Gray ne rendent pas deux noms de groupes-espèces disponibles, deux autres interprétations sont possibles selon l'identité de l'auteur du nom *tuberculatus*. Si l'auteur est Gray, *Mystacina tuberculata* Gray représente un mélange d'espèces (englobant *Chalinolobus tuberculatus* et *Mystacina tuberculata*). Par contre, si l'auteur est plutôt G. Forster, le genre *Mystacina* créé par Gray est basé sur une espèce-type mal identifiée et "*Mystacina tuberculata* Gray" n'existe pas. Dans ce cas, l'épithète spécifique doit être remplacée par le prochain nom disponible, soit *velutina* Hutton, 1872 (dans le cas présent, il s'agit du premier nom disponible). Cette option permet de préserver l'usage

courant du genre *Mystacina* en établissant que l'espèce-zoologique examiné par Gray représente l'espèce-type. Nous recommandons de choisir cette option pour que G. Forster soit à juste titre considéré comme l'auteur de *Vespertilio tuberculatus*, tel que stipulé dans l'article 50 du Code International de Nomenclature Zoologique. Par ailleurs, cette option permet de sélectionner un spécimen type d'un lieu connu pour *Mystacina velutina* et de préserver la classification infraspécifique actuelle de *Mystacina* ainsi que l'utilisation habituelle du genre *Mystacina* et de la famille Mystacinidae. Le seul nom valide de la petite chauve-souris à queue courte de Nouvelle-Zélande est alors *Mystacina velutina* Hutton, 1872, et nous désignons comme lectotype le spécimen de Hutton, récolté à Hutt Valley (près de Wellington, Île du Nord, en Nouvelle-Zélande).

New Zealand is home to but two endemic land mammals, both of which are bats. According to current taxonomy (e.g., Koopman 1993) they are the vespertilionid *Chalinolobus tuberculatus* (Forster, 1844) and mystacinid *Mystacina tuberculata* Gray, 1843. (A second *Mystacina* species, *M. robusta* Dwyer, 1962, first described as a subspecies of *M. tuberculata*, is thought to be extinct—Daniel 1990.) *Mystacina* is of especial interest because of its broad ecological niche, probable nearest relationship with the American noctilionoids, and long history of residence, if not also origin, in New Zealand (Pierson et al. 1986, Hand et al. 1998, Kirsch et al. 1998). In contrast, *Chalinolobus tuberculatus* is clearly a close relative of Australasian species belonging to the same genus and subgenus (Daniel 1979, 1990; Koopman 1993, 1994).

The respective families of the two New Zealand bats are widely separated in current chiropteran classifications (Koopman 1994, Kirsch et al. 1998, Simmons & Geisler 1998), yet for many years the two species were confounded (Tomes 1857). While the history of the specific classification of *Mystacina tuberculata* has several times been recounted, most recently by Hill & Daniel (1985), we believe that the nomenclatural conclusions drawn by most previous authors are incomplete, if not in error. In fact, the correct application of the name *Mystacina tuberculata* is unclear, and it is thus

also unclear what the valid name is for the lesser New Zealand short-tailed bat (hereinafter, "the mystacine"). Here we attempt to clarify the history of the species' nomenclature, and to arrive at a resolution of the difficulties encountered that will best promote the stability and universality of nomenclature. We will conclude that the specific name *velutina* Hutton, 1872 must be adopted for the mystacine, and select the zoological species before Gray as the type species of *Mystacina*, so as to preserve the genus and family names in their current and, historically, sole applications.

#### An Historical Sketch

*The first descriptions of the chalinolobe.*—In May of 1773, at Queen Charlotte's Sound, South Island, New Zealand, Johann Reinhold Forster, naturalist on Cook's second voyage, shot and subsequently described, and his accompanying son George drew ("a me descriptus et a filio delineatus"—Forster 1844:63), an exemplar of the bat now called *Chalinolobus tuberculatus* (hereinafter, "the chalinolobe"). In his journal, under the date of 21 May, Forster writes, "I shot a a new Shag, never before described", and that, "[i]n the morning I described the new Shag... & George drew the Shag & a new Bat, which we had got" (Hoare 1982:283); as Forster used ship's time (i.e., noon of the previous



day to noon of the date of entry) in dating his entries, the drawings were made on the morning of 21 May. There appears to be some discrepancy concerning the dates of collection and description of the shag: Hoare (1982) identifies it as *Pelecanus* (= *Phalacrocorax*) *carunculatus*, but Forster (1844) proposed that name under the date of 20 May, the apparent date of the shag's collection; neither Lysaght (1959) nor Hoare (1982) question the date in Forster (1844). However, the dating of events relating to the bat is consistent among Forster's writings.

Despite an Admiralty ban on publication urged by Cook (Quammen 1996), both Forsters published early accounts of their travels, in which allusions to the bat are presented; neither Forster, however, mentions the bat by scientific name in their general accounts of the 1772–1775 voyage. J. R. Forster notes the resemblance of the New Zealand bat to Pennant's "New-York bat" (Forster 1778:130 in the 1996 reprint), while George Forster (1777) is even more casual in his *Voyage*, stating only that the bat is one of five mammals found in New Zealand.

It was not until nearly 50 years after his death that J. R. Forster's account of the zoology of Cook's second voyage, edited by Lichtenstein, was published (Forster 1844). In it the bat is described as *Vespertilio tuberculatus* under the entry for 22 May. As we know from this description that the bat lived two days after being shot in the wing, 20 May seems probable as the date of its collection. Forster again refers to Pennant, comparing the new species to "*V. novëboracensi* [s]", a synonym of *Lasiurus borealis*. That the creature was regarded as a new species of *Vespertilio* is unsurprising: at the time of collection only two genera of bats were recognized—*Noctilio* Linnaeus, 1766 (placed by Linnaeus among Glires) and the vastly heterogeneous *Vespertilio* Linnaeus, 1758 (then and until Erxleben [1777] including even pteropodids, and placed within Primates by Linnaeus). In a footnote on

page 62 of Forster (1844), added by the editor, comparison of *Vespertilio tuberculatus* is made to species of *Scotophilos* [sic] and *Miniopterus*. According to Whitehead (1969), no surviving mammal specimens can be traced from any of Cook's voyages, and so George's drawing, now in the British Museum (see below), is the only extant non-written evidence concerning the first bat collected in New Zealand.

While J. R. Forster's description of the bat was not published until 1844, George's illustration, with the name *Vespertilio tuberculatus* written on it, was known to British zoologists prior to posthumous publication of his father's work, as, probably, were some of both of the Forsters' manuscripts (Whitehead 1978). On the basis of this knowledge, a brief description of the chalinolobe appeared in 1843 in an appendix prepared by John Edward Gray for Dieffenbach's *Travels in New Zealand*. On page 181 of volume two of Dieffenbach (1843), the Forsters' bat is characterized thus:

Fam. VESPERTILIONIDÆ.

1. *Vespertilio tuberculatus*. G. Forster. Icon. ined., n. 1.  
Yellowish brown; ears small, rounded.  
Inhab. Dusky Bay, New Zealand. G. Forster.

Hill & Daniel (1985), like Thomas (1905) before them, were of the opinion that this short characterization is sufficient to make the name available, and we agree (International Commission on Zoological Nomenclature [ICZN] 1985:Art. 12a). As will be seen, parts of this description are inaccurate; however, a description need not be accurate in order to make a name available. Taken on its face, this passage seems to indicate that G. Forster is the author; this impression is reinforced when note is taken of further passages in Dieffenbach in which Gray clearly attributes to himself names he (Gray) therein proposes. Hill & Daniel (1985), however, attribute authorship to Gray (*in* Dieffenbach 1843:181). Thomas

(1905:423) was a bit more equivocal in his attribution, giving the full citation as “Gray (ex Forst.)”. Gray incontestably attributes responsibility for the name and locality (which, as we know from J. R. Forster [1844], is incorrect) to George Forster. As will become evident, the critical nomenclatural question is whether the whole of the description is attributable to George, thus establishing him as the one responsible both for the name and for satisfying the criteria that make it available (ICZN 1985:Art. 50a), or whether some part is attributable to Gray.

*George Forster's drawing of the New Zealand bat.*—No illustrations, by George or otherwise, appear in Forster (1844), so that Hill & Daniel's (1985) statements that George Forster's drawing was published in 1844, if intended to refer to the Lichtenstein edition, are apparently in error. George's drawing of the bat has, to our knowledge, been published only once, and then incompletely, including just one of the two figures on the drawing (Andrews 1986:28). Through the courtesy of the authorities of the British Museum (Natural History), we have been able to examine the original in London, and here publish it fully for, we believe, the first time, as Fig. 1.

The drawing of the bat is number 1 of a series of 271 zoological drawings from Cook's second voyage bound in two volumes (Whitehead 1978). Although a few of these drawings are by other artists, it is well attested that the drawing of the bat is by George (Forster 1844, Whitehead 1978, Hoare 1982). In a catalogue of these drawings (“Catalogue B” of Whitehead 1978) by one of Joseph Bank's associates, probably Dryander (A. Wheeler, pers. comm.; Whitehead [1969] agreed, but later [1978] thought Solander was its author, although this seems unlikely given Diment & Wheeler's [1984] failure to discuss this catalogue), the notation “*Vespertilio tuberculatus*, N. Zel. Charlotte Sound” is made in reference to the drawing. The recto of the drawing has two views of the bat, one ventral, the

other lateral with wings folded. The drawing is in pencil, and the bats have been colored. The body of the upper bat is colored dark brown and a lighter shade of brown. The wings are gray. The lower bat is a more uniform dark brown, and appears to be lit from behind, with a shadow falling towards the viewer. Figure 2 is a reproduction of a sketch made from Forster's drawing which includes details not obvious in the reproduction in Fig. 1.

Below the bats, also in pencil, is written “*Vespertilio tuberculatus*”; in the upper right is the number “1.”, and in the lower left “Geo Forster”, both of the latter in ink. According to Whitehead (1978; see also Lysaght 1959), scientific names were written on the drawings by George or J. R. Forster, while George Forster's name was added later by Dryander, it being uncertain by whom and when the drawings were numbered (although certainly prior to 1843). On the verso, “New Zealand Charlotte's Sound” is written in pencil. Apparently different hands are responsible for the scientific name, artist's name, and locality. Whitehead (1978) failed to record any writing on the verso of the bat drawing, but also did not note that two figures are present, nor the notation of locality in “Catalogue B”. It is possible that the verso locality was added later, perhaps even after the first publication of the correct locality by J. R. Forster in 1844; Whitehead (1978) notes that a number of later annotations were made to various of the drawings, but we consider it more likely that Whitehead inadvertently omitted this information than that the verso locality was added after 1978. Wheeler (pers. comm.) believes that the verso locality may be in the hand of J. R. Forster; if Whitehead's (1978; see also Lysaght 1959) attribution of the scientific names is to be credited, then the binominal is in the hand of George Forster.

*The first description of the mystacine.*—The account of *Vespertilio tuberculatus* on page 181 is not the only passage in Diefenbach (1843) concerned with bats. In an





Fig. 1. George Forster's colored drawing of the bat obtained at Queen Charlotte's Sound, South Island, New Zealand, on or about 20 May 1773. Reproduced from a transparency, by permission of the authorities of the British Museum (Natural History), a.k.a. The Natural History Museum, London. The insets are enlarged and computer-enhanced to show more clearly some of the writing on the drawing.



Fig. 2. Pencil sketch of Forster's drawing by JG showing details not evident in the reproduction in Fig. 1. The shadowing in the lateral view of the bat has been omitted, and the distance between the two views reduced. Scale line is 2 cm.

appended note on page 296, prepared after earlier pages were already printed, Gray returns to a consideration of the Chiroptera of New Zealand, where he provides the first description of a mystacine:

*Vespertilio tuberculatus*, p. 181.—I have just received two specimens of this bat: it is a new genus, differing from *Embalonura* [sic], Kuhl, and *Urocryptus*, Temm., in having only two large cutting teeth in the middle of the upper jaw; the fur is close, erect, dark brown, with minute white tips to the hair; the under surface is paler; the face has a series of short, rigid, black bristles round the base of the muzzle, the wings near the body and bones of the limbs are thickened and transversely grooved; the tragus is elongate, subulate. It may be called *Mystacina tuberculata*.—J. E. GRAY.

While this account makes it clear that the two specimens before Gray were mystacines (although, significantly, it does not distinguish between the living species and the then-extant *M. robusta*), it also demonstrates that Gray believed he was describ-

ing further specimens of a bat already known: the one described for the first time on page 181. His intent on page 296 was not to name a second species, but to point out this previously known species' generic distinctness from *Vespertilio*, proposing for it the new genus *Mystacina*. (Such a separation from *Vespertilio* here is not audacious: by 1843 over 40 genera of bats had been described, many simply representing subdivisions of the once-comprehensive *Vespertilio*.)

There is only the slightest hint that Gray in 1843 might have thought there to be more than a single species of bat in New Zealand. On page 182 of Dieffenbach, following the account of *Vespertilio tuberculatus*, Gray presents two quotations with parenthetical and interpolated comments:

“The *Pekápeká*, or Bats, and various small batlets, are very common in the Island, but none of the Vampire species. (Pteropus? or Glossophaga?) They



are among the smallest of the Australian species.”—*Polack*, i. 304. I am not aware that any of these animals have reached Europe; they would be interesting, and doubtless new. “There is, apparently, only one species; probably the one figured by Forster.”—*Dieffenbach*.

Hill & Daniel (1985) reproduce only the second of the remarks quoted by Gray, as evidence that he did not (then) believe in the existence of additional New Zealand species, yet Gray’s inclusion of the quotation from J. S. Polack (1838:304; imprecisely and incompletely transcribed by Gray) might suggest otherwise. But in any case, we reiterate there can be no doubt that Gray considered his two new specimens to be exemplars of the Forsters’ bat. Thus Gray confounded two very different species, with consequences to be explored below.

Dieffenbach’s work, with the zoological appendix entitled “Fauna of New Zealand”, was published in January 1843 (Sherborn 1932); later in 1843, Gray published a List of the Specimens of Mammalia in the Collection of the British Museum, wherein he reiterated his belief in the identity of *Mystacina tuberculata* and *Vespertilio tuberculatus* (Gray 1843a; the introduction is dated “May-Day, 1843”, and a copy in the library of the Field Museum of Natural History bears the manuscript annotation “May 13”, without a year).

Once more in 1843, Gray returned to consider, at least briefly, the mystacine, in his contribution to The Zoology of the Voyage of H.M.S. Sulphur (Gray 1843b). While sometimes cited as the first description of *Mystacina* (e.g., Dobson 1878, Miller 1907), this work undoubtedly appeared after Dieffenbach (1843) and Gray (1843a), although, contrary to Hill & Daniel (1985), apparently not as late as 1844. The Zoology of the Sulphur was issued in parts from 1843 to 1845 (Zimmer 1926). A copy of the third part (on birds) in original wrappers in the library of the Field Museum bears the date October 1843, while the fourth part (also on birds), dated January 1844, has on

the wrappers an advertisement stating that parts 1 and 2 on mammals and part 3 on birds have already been published. A bound copy of the first two parts (including the “Summary of the Voyage” in part 1, as well as the complete mammals) in the same library has a “Temporary Title” page with the date 1843. The section on mammals is also cited as 1843 by earlier authors (e.g., Tomes 1857, Dobson 1878, Miller 1907). The British Museum Catalogue’s (1903–1915) date of 1844, cited by Hill & Daniel (1985), is simply in error; and there seems to be no confusion of the Zoology of the Sulphur and Captain Belcher’s general account, as suggested by Hill & Daniel (1985). While thus appearing before 1844, parts 1 and 2 of the Sulphur nonetheless seem to have appeared after Gray’s List (1843a; and thus also after Dieffenbach 1843), as in the main text of the List Gray cites the Sulphur by unnumbered plates, rather than by precise page and plate numbers as he does for his other works, and states (page vii) that the Zoology of the Sulphur is “now in the course of publication.” He does give precise plate references to the Sulphur in a page (196) of “Corrections” likely added to the List shortly before it was published; in the Sulphur, by contrast, he gives precise page references to his List throughout. These facts indicate that the Sulphur was in preparation but not yet complete or published at the time of the writing of Gray’s List (1843a).

Gray’s remarks in the Sulphur also give no indication that they are intended to name a taxon. In his account (page 22), Gray explicitly states that he is only mentioning *Mystacina* and related genera “[f]or the purpose of showing the natural relations, and the distinctive characters of the two new genera [*Mosia* and *Centurio*] figured”. The entire account of *Mystacina* is but three lines long, and read in context is clearly synoptic rather than descriptive: “MYSTACINA, Gray.—Nose rather produced, surrounded at the base with a series of short rigid bristles. Interfemoral membrane trun-

cated. Cutting teeth  $\frac{2}{6}$ , upper large. *M. tuberculata*, New Zealand.” Further, as Hill & Daniel (1985) remark, the *Sulphur* did not visit New Zealand, and no specimens of *Mystacina* were described in the *Zoology*.

*Subsequent recognition of two species.*—Gray (1843a), in his *List*, had restated his belief in the identity of *Mystacina tuberculata* and *Vespertilio tuberculatus*. The confounding of these two very different species was not recognized until Tomes’ (1857) treatment of New Zealand bats, which was based on specimens in the College of Surgeons, British Museum, and Leiden collections. Therein, Tomes also reasigned *Vespertilio tuberculatus* to *Scotophilus*. Both New Zealand bat species were figured by G. H. Ford for Tomes. In coloring, Ford’s plate of *Vespertilio tuberculatus* corresponds more closely to George’s 1773 drawing and the characterization in Forster (1844), which Tomes accepts as the first published description of the chalinolobe, than to the description given in Diefenbach (1843:181). Ford’s lithograph is clearly not a copy of Forster’s drawing, and, contrary to Andrews (1986:64), there is no indication that it is of the Forsters’ specimen: as noted earlier, all of the mammal specimens from Cook’s voyages appear to have been lost (Whitehead 1969).

While lamenting that the specific names of *Scotophilus tuberculatus* and *Mystacina tuberculata* were so similar, Tomes (1857: 135) realized that this was an irrelevant consideration, as the bats were undoubtedly different:

As the above-mentioned zoologists have certainly been the first describers of two distinct animals, the names imposed by them will of course be retained; but it is much to be regretted that their specific names are similar; and the more so, as the one most recently given was clearly intended as a reference to the earlier known species.

Thus Tomes accepted Gray’s description and naming of the mystacine in Dieffenbach (1843) as valid, but either discounted or (less probably) was unaware of the characterization of the chalinolobe on page 181

of the same work, while also recognizing that knowledge of the chalinolobe dates from much earlier.

Hill & Daniel (1985) note the presence of both species, properly labeled as such, among material registered by Gray in 1844 (and sent in 1843 by Dr. F. Knox from Port Nicholson [= Wellington]), which suggests that Gray had come to recognize their distinctness on the basis of his own comparisons. Nonetheless, much later Gray (1875: 12b), in the *Zoology of the Voyage of the H.M.S. Erebus & Terror*, acknowledged Tomes’ analysis, and gave no indication that he, Gray, had distinguished the bats by himself:

I at first thought this was the little Bat named and figured as *Vespertilio tuberculata* [sic] by Forster, collected during Cook’s voyages, the drawings of which are in the Banksian Library, British Museum, and of which Lichtenstein published Forster’s MS. descriptions and notes in 1844, but Mr. Tomes, who has found in the British Museum two kinds of Bats from New Zealand, believes that the one which is a *Scotophilus* is the one which Forster described, on account of the number of incisors he indicates, and describes it as *Scotophilus tuberculatus*, P.Z.S., 1857, 154 [sic: 135], pl. 43 [sic: 53], and he also describes and figures the one that I have described as *Mystacina tuberculata*, P.Z.S., 1857, 138, pl. 44 [sic: 54].

Gray’s comments here are accompanied by a plate in which the mystacine is figured (Gray 1875:plate 22, fig. 1; probably by Waterhouse Hawkins, who did others in the series). Although not published till 1875, this plate was prepared much earlier (probably in 1844—see Günther [1875] and Hill & Daniel [1985] on the publication history of the *Erebus & Terror*), and had been seen by Tomes (1857), but is unlikely to be of the specimen figured in Ford’s drawing in Tomes. The *Erebus & Terror* mystacine is shown apparently in flight, and from the dorsal aspect (presumably to show the emballonurid-like penetration of the uropatagium by the tail), “flying” from the upper left toward the lower right of the page, and with its head thrown backwards—either because that was the case in the specimen or



in order better to display the face. However, details of the patagia (as well as the position of the head) are different from those in the more hieratic dorsal view in Ford's figure.

*Later considerations of the chalinolobe.*—Although the later nomenclatural history of the chalinolobe is not entirely without incident (Dobson [1878] confounding it with the Australian species *morio* Gray [Thomas 1889, 1905]), the details of this history need not detain us. From the point of view of our inquiries, the important action is Peters' (1867; as noted by a reviewer, though often cited as 1866, pages 657 ff. of this volume were published in 1867) proposal of the genus *Chalinolobus*, type by monotypy *Vespertilio tuberculatus*. Peters credits Forster with this binominal, but neither specifies which Forster nor gives any bibliographic citation. Fifteen species are currently included in *Chalinolobus*, six in the nominate subgenus (Koopman 1993), and the stability of their names is potentially affected by resolution of the proper application of the species-group name *tuberculatus*.

*Later considerations of the mystacine.*—Subsequent authors have accepted the existence of two New Zealand bat species, and have been more concerned with the peculiar ecology and broader phylogenetic affinities of the mystacine (reviewed by Daniel 1979, 1990; Kirsch et al. 1998) than with nomenclature. Important exceptions, however, are Hutton (1872), Thomas (1905), and Hill & Daniel (1985).

Hutton (1872) briefly reviewed New Zealand's bats, and, like Tomes, regretting the similarity of the specific names of the chalinolobe and mystacine, proposed the species-group name *velutina* for the mystacine; his comments were based on two specimens of the mystacine then in the Colonial Museum. Thomas (1905), having had his attention called to the two passages on bats in Dieffenbach (1843), which he had previously overlooked, concluded that the brief description of the chalinolobe under the name *V. tuberculatus* on page 181 pre-

empted Gray's page 296 usage of the specific name for the mystacine, and therefore Thomas adopted Hutton's name *velutina* for the mystacine. Thomas was likely influenced by the fact that, although published in the same work, and thus simultaneously, the account on page 181 was clearly written before that on page 296, and so held a sort of temporal, as well as page, priority. (Oddly, while Thomas credits Miller and Palmer with alerting him to Dieffenbach, Miller [1907] does not himself cite that publication in his account of the mystacine, and uses the specific name *tuberculatus* for it.)

Both Thomas and Miller used the generic name *Mystacops* Lydekker for the mystacine. *Mystacops* had been proposed as a replacement name by Lydekker (*in* Flower & Lydekker, 1891) in the belief that *Mystacina* was preoccupied by *Mystacina* Boie, 1822 (a genus of birds). However, as pointed out by Simpson (1945) and Dwyer (1962), Boie's (1822) name was *Mystacinus*, and the difference in ending is sufficient to prevent homonymy (ICZN 1985: Art. 56b).

Hill & Daniel (1985), in a study of geographic variation in the mystacine which included a careful study of extant specimens at the British Museum and a review of the species' nomenclature, differed with Thomas (1905). While accepting his conclusion that the chalinolobe had been properly named in Dieffenbach, they rejected his conclusion that this necessitated the adoption of *velutina* for the mystacine. They rejected this on two grounds: first, on the irrelevant basis that Thomas' proposal had not been generally adopted; and, second, on the ground that no provisions of the Code required such a change. As we shall see, this latter point is problematic. The essence of their analysis is that, in Dieffenbach, Gray proposed two different species-group names for two different zoological species. But, as we have already seen in this historical review, and will explore further below, such was certainly not the case.

## Analysis

*Two species-group names or one?*—The two bat descriptions in Dieffenbach—that on page 181 relating to George Forster's drawing, and the one on page 296 referring to the two mystacine specimens—create a nomenclatural problem, as was first appreciated by Thomas (1905). Are two species-group names proposed in Dieffenbach or only one? The preceding historical sketch makes it certain that Gray regarded both the bat illustrated by George Forster and the two specimens Gray later received as members of the same species. Thomas (1905: 423) also saw this clearly, noting that when Gray discussed the mystacine on page 296 he did so “distinctly stating his opinion that it was the same bat” as was mentioned on page 181. On page 296, Gray had no intention of naming a second species, and in fact did not do so. We can thus state categorically that only one specific name was proposed in Dieffenbach (1843).

Given that but one name is proposed, much depends on who we suppose the author of that name to be. If it be Gray, as Hill & Daniel (1985), and, somewhat less emphatically, Thomas (1905) concluded, then *Mystacina tuberculata* is composite (the syntypical series including a chalino-lobe and two mystacines), and the name must be fixed on one part or the other. If, on the other hand, the author is George Forster, as Sherborn (1931), definitely, and Dwyer (1962), apparently, concluded, then the name refers unequivocally to the chalino-lobe, and the mystacine requires a name. A further consequence of G. Forster's authorship would be that the genus *Mystacina* would then be based on a misidentified type species (ICZN 1985:Art. 70b), as Gray mistakenly believed his two mystacines to be conspecific with the chalino-lobe in George's drawing.

The question of authorship hinges upon who provided the name and the conditions that make it available (ICZN 1985:Art. 50a), and this in turn depends on the inter-

pretation of the passage on page 181 of Dieffenbach. In order for authorship of a name to be attributed to someone other than the author of the work in which it appears, the Code requires that the evidence for this attribution be “clear from the contents of the publication” (ICZN 1985:Art. 50a). A straightforward reading of page 181 seems to indicate that this requirement is met: Gray is attributing the name and the conditions that make it available to G. Forster. It is undeniable that Gray attributes both the name and the locality to George, and the name appears on George's drawing, likely in his own hand, and thus George surely has provided at least one of the two elements that the Code requires; but, it might be contended that Gray has provided the description that makes the name available. The question is, in short, who wrote the five words of description on page 181?

*Whose words are they?*—That Gray cites G. Forster on two of the lines on page 181 could mean that the intervening line containing the five words was his (i.e., Gray's); but it could equally plausibly mean that Gray merely wanted to make clear the source of the name, as distinct from the other information, which he also attributed to George. Gray need not have put Forster's name at the end of every line in order to make an attribution to George. Indeed, in his account in Dieffenbach (1843) of the “Sea Bear” (*Arctocephalus ursinus* [Linnaeus, 1758], now *Arctocephalus forsteri*), Gray gives information which comes directly from the Forsters (which we know because the Forsters' notes survive on George's drawing or in “Catalogue B”—Whitehead 1978) without immediate attribution, showing that he did not always put Forster's name after every line derived from him. In the account of the bat, Gray was, if anything, more careful and explicit in citing George twice, perhaps because a newly proposed name was involved, whereas the “Sea Bear” had been named previously.

Gray does himself name and describe several new species in Dieffenbach, but



when doing so follows the new species' name with "Gray, n.s.", then the locality, and finally the description; this is not the format he follows on page 181, in which the words of description are enclosed within attributions to G. Forster. Since the only plausible interpretation of Gray as the author would have him describing George's drawing, it is significant that one of the new species names proposed by Gray (*Balaena antipod[ar]um*, now *Eubalaena australis*) is based on the description of a drawing, and that Gray is quite explicit about that basis (page 184): "The above short description of this species is taken from a very good drawing . . .". No such statement of derivation accompanies the account of the bat.

The description might credibly be attributed to Gray if it consisted of a characterization of George's drawing. The fact that the locality given on George's drawing does not match that cited as from G. Forster on page 181 suggests that Gray was working from some written notes by George, and not just the drawing. Perhaps even more persuasive evidence that Gray was not working from the drawing alone is that its color does not correspond to that given in Dieffenbach ("Yellowish brown"; cf. Fig. 1). These notes could not have been J. R. Forster's manuscript descriptions (eventually published in 1844), because the latter give a locality ("in estuario reginae Charlottae" [Queen Charlotte's Sound]—Forster 1844:63) and color description ("Alae . . . fuscae, . . . Vellus ubique . . . fusco-ferrugineum" [Wings . . . dusky, . . . Fur dark-rusty brown all over]—Forster 1844:64) different from those on page 181 of Dieffenbach, and, in any event, Forster's manuscript had long been in Berlin by the time Gray was writing. Unless he was simply making things up, Gray must have been working from written material by George, because the source is clearly neither the drawing nor J. R.'s manuscript. That some of the Forsters' manuscripts have been lost is undeniable: Whitehead (1978) records that the Forsters furnished information to Joseph

Banks, the documents of which no longer survive, and George's extant journal ends at 11 May, eight days before the Resolution reached Queen Charlotte's Sound (Hoare 1982).

How might George have been the source of erroneous locality and color information? Dusky Bay was visited by the Resolution, and it figures prominently in George's extant journal (Whitehead 1978); it is also, as H. Spencer (in litt.) has pointed out to us, the locality of the "Sea Bear", the subject of the second of George Forster's drawings, on the verso of which the locality is written, and Gray (*in* Dieffenbach 1843:182) did cite this drawing in his account. Gray may just have made a hasty inference or transcription error. As regards the color, notes from the Forsters in "Catalogue B", reproduced in Whitehead (1978), make it clear that their remarks on coloring often consisted of critiques of the drawings; thus "Yellowish brown" could be an admonition for modulation of the applied color, rather than a description. Gray, never having seen the bat, could not have known the import of such a note.

Absent written evidence, we cannot now know for sure whether the five words of description are Gray's or George's but given the citation of G. Forster, both following the name and at the account's conclusion, it was clearly Gray's intent to attribute the name and description, and thus authorship of *Vespertilio tuberculatus*, to the younger Forster. This conclusion is strengthened by looking at Gray's List published a few months later (1843a:34), which reads "The MYSTACINE. *Mystacina tuberculata*, Gray, Dieffenb. Jour. App. 296. *Vespertilio tuberculatus*, G. Forster, Icon. ined. in Brit. Mus. t. 1." As is clear from the form of citation Gray uses in his List, this passage indicates that Gray attributes to himself the combination *Mystacina tuberculata*, while he attributes the specific name *tuberculatus* to G. Forster (which also demonstrates, as we believe is patent from Gray in Dieffenbach as well, and as Sherborn [1931] also

indicated, that Gray did not consider himself to have proposed a new species *tuberculata* in the genus *Mystacina*, but rather to have placed Forster's species *V. tuberculatus* in the new genus *Mystacina*). It is clear that the name came from G. Forster, that all knowledge Gray had of the species came from Forster's work (the drawing and perhaps manuscripts), and that Gray attributed the name and the description to Forster. We should not cast aside these certainties as to the source of the name, knowledge of the species, and Gray's own attribution.

Thus, it is our judgment that the description is more likely to be George's than Gray's—and therefore that George not only named the bat, but also satisfied the conditions that make that name available. All the internal evidence of the contents of the publication—of Gray's attributions, citations, and format—indicates that, under Article 50a, authorship should be attributed to George Forster. The external evidence—the lack of correspondence between the drawing and the published account, Gray's later publications—even if it were admissible under Article 50a (which it is not), also fails to support the contention that Gray is the author. The name is thus properly cited as *Vespertilio tuberculatus* G. Forster in Dieffenbach, 1843:181.

*The consequences of G. Forster as author.*—On the interpretation that the description as well as the name on page 181 are George Forster's, and therefore that he and not Gray made that name available, an inescapable conclusion is that there is no such name as “*Mystacina tuberculata* Gray in Dieffenbach, 1843”; there is only *Mystacina tuberculata* (G. Forster in Dieffenbach, 1843) sensu Gray, 1843 (ICZN 1985: Art. 51b(i)). Gray confused the two specimens before him, and thus also the type species of *Mystacina*, with Forster's *Vespertilio tuberculatus*. This leaves the bats before Gray without a species-group name, and the genus *Mystacina* with a misidentified type species. We consider these two issues in turn.

*The species-group name of the mystacine.*—“*Mystacina tuberculata* Gray in Dieffenbach, 1843:296”, being a misidentified type species, rather than the proposal of a new species, cannot possibly be the name for this bat. Gray did use this combination in several other publications (e.g., 1843a, 1843b), and it might be argued that these accounts make the name *tuberculata* available in *Mystacina* as of these publications. The Code, however, explicitly prohibits this: Article 49 states that “[a] previously established species-group name wrongly used to denote a species-group taxon because of misidentification cannot be used for that taxon even if it and the taxon to which the name correctly applies are in, or are later assigned to, different genera . . .”.

The valid species-group name of the mystacine must thus be the next available name, which, in this case, is actually the first available name (ICZN 1985:Art. 23e): *velutina* Hutton, 1872. This name was introduced by Hutton to replace “*tuberculata* Gray”. It is not, however, strictly speaking, a replacement name in the sense of the Code. A replacement name is proposed to replace an available name, but “*tuberculata* Gray” is not an available name, and was not intended to be one by Gray. Thus Article 72e, on the typification of replacement names, does not apply. Article 72b(ii) and (iv), on the type series of names based in whole or part on previously published misidentifications or unavailable names, does apply, and thus the type series of *Mystacina velutina* consists of all specimens before Hutton, plus Gray's two specimens.

Gray's specimens cannot now be traced (see below), and, given the recognized geographic variation in the lesser mystacine, and the existence in the 1840s of a second species of mystacine (*M. robusta*) in the environs of the South Island, their lack of specific locality data makes them a poor choice to be name bearers. The current whereabouts of the two specimens examined by Hutton in 1871 are also not known. They



are not in the National Museum in Wellington; the earliest extant bats currently in that collection were presented in 1877, virtually all the earlier collection having been destroyed by damp and mold in the 1880s–1890s (C. Paulin, in litt.). It was the practice of the Colonial Museum to send type specimens from New Zealand to the British Museum, but such specimens were often not clearly labeled as such, and may have been accessioned into the British Museum collection under some other name, and without their nomenclatural importance being noted (C. Paulin, in litt.). Dobson (1878) records two specimens in the British Museum, “e” and “f” of his list, from “Wellington, New Zealand” received from the Colonial Museum. Hill & Daniel (1985) note that only one of these two was registered, in 1876: BM(NH) 76.4.8.1. It seems quite possible that Dobson’s “e” and “f” (including BM(NH) 76.4.8.1) were those before Hutton from the Colonial Museum (“Wellington” recording from where they were sent, rather than the exact locality), but we cannot now be certain of this.

Although they cannot be traced with certainty, Hutton’s specimens do have exact localities: “the Hutt Valley, near Wellington” and “Milford Sound, on the southwest coast of the South Island.” This is fortunate, as Hill & Daniel (1985:290) have based their subspecific arrangement on a conception of the nominate form as occurring near Wellington. We thus ratify and preserve the nomenclatural stability of their arrangement by selecting as lectotype of *M. velutina* Hutton, 1872 the specimen from the Hutt Valley, near Wellington (ICZN 1985:Art. 74c). Being on the North Island, this locality also excludes the possibility of confusion with the extinct *M. robusta*, as Wellington is outside its historic range (Daniel 1990).

It is worthwhile noting here that the use of *velutina* is in no way in violation of the presumptive statute of limitation which gives the benefit of the doubt to stability when it conflicts with priority (ICZN 1985:

Art. 79c). This provision applies to the proposed substitution of an unused senior synonym for a junior synonym, not the substitution of an available name for an unavailable name. Nor does it violate the stronger injunction against the displacement of names in the fourth edition of the Code (ICZN 1999), which again does not apply to unavailable names; and in any event, *velutina* has been used as a valid specific name after 1899 (Minelli & Ride 1997).

*The generic name of the mystacines.*—In the following, we apply the provisions of the fourth edition of the Code (ICZN 1999), on the recommendation of Dr. P. Tubbs, Executive Secretary of the ICZN, to use these provisions during the interregnum between publication of the new edition and its effectuation, as during this time action by the Commission under Article 70 of the third edition of the Code is no longer possible or, indeed, necessary under the new edition. Explicit provision is made for cases where an author erects a new genus on the basis of specimens to which he has applied the wrong specific name, the applicable section in the fourth edition being that on misidentified type species in Article 70. The article lays out two courses of action which an author discovering such a case may take: either to let the species mentioned by the author of the genus, regardless of misidentification, remain as type species of the genus (i.e., *Vespertilio tuberculatus* G. Forster would be the type species of *Mystacina*); or, to designate the species actually before the author of the new genus as the type species. The principle that we believe should guide action in this case is that types of taxa are zoological objects, not names (Mayr 1969). Thus we believe that the species actually before Gray should be the type of *Mystacina*. We have already noted that Gray’s description, while diagnostic to genus, does not exclude the possibility that he may have had a specimen of *M. robusta*, and the locality, “New Zealand”, ascribed to Gray’s specimens in his List does not allow us to exclude *M. robusta* on geo-

graphic grounds, either. However, in historic times the lesser mystacine (*M. tuberculata* auctorum) has been more widespread and abundant than *M. robusta*, and no specimens of the latter are certainly known to have been collected in the 19th century. In addition, the specimens provided by Sir George Grey, which we believe may have been Gray's specimens (see below), are of the lesser mystacine. We are thus confident that at least one of the two specimens before Gray was of the lesser mystacine, and this species, of which we have shown *velutina* Hutton, 1872 to be the valid species-group name, should be the type species of *Mystacina*.

This action would also promote the stability and universality of nomenclature. Were the misidentified species to remain the type species of the genus, it would disassociate *Mystacina* Gray, 1843 from all zoological species with which it has ever been associated; make *Mystacina* Gray, 1843, by virtue of its becoming a senior objective synonym of *Chalinolobus* Peters, 1867, the valid generic name for the chalinolobe and its fourteen congeners, forcing a change in the names of these species; make *Mystacinidae* a family name in a section of the Microchiroptera distant from its usual application in or near the Noctilionoidea; and leave the mystacines without a generic or family name, leading to further nomenclatural changes. (*Mystacops* Lydekker, 1891, and the family name based on it, *Mystacopidae* Miller, 1907, do not help here, inasmuch as *Mystacops*, being a replacement name *sensu stricto*, takes the same type species as *Mystacina*, and would thus also apply to the chalinolobe—ICZN 1985:Art. 67h.)

In contrast, having the species actually before Gray as type species of the genus would allow the name *Mystacina* to continue to be the valid generic name for the endemic noctilionoid bats of New Zealand, as it has been assumed to be since 1843; allow *Mystacinidae* to continue in its familiar application; and lead to no changes in the no-

menclature of the chalinolobe and its congeners. We thus hereby designate the zoological species we believe to have been before Gray, the valid specific name of which is *velutina* Hutton, 1872, as the type species of *Mystacina* Gray, 1843. Should it later be shown that both of Gray's specimens were *M. robusta*—an eventuality we consider highly improbable—then *M. robusta* Dwyer, 1962, as the only zoological species before Gray, would be the type species of *Mystacina*, and familiar usages of the generic and familial names would again be preserved.

*What if Gray were the author?*—Though we believe that a preponderance of the evidence, including, most trenchantly, the contents of Dieffenbach (1843), leads to the conclusion that George Forster is the author of the description of the chalinolobe, we acknowledge the possibility that it might be Gray. It is therefore useful to explore the implications of this assignment of authorship. We believe that these implications, though not admissible in deciding authorship, offer additional justification for our choice in favor of George.

On the interpretation that Gray is the author, *Mystacina tuberculata* is a composite species because Gray considered the Forsters' bat and the two later-received specimens to be conspecific, thus forming a compound syntypical series (ICZN 1985: Art. 72b); although the two mystacines were seen later by Gray, publication on the three specimens (i.e., the mystacines and the Forsters' bat), because in the same work, was simultaneous. In this case, *Mystacina tuberculata* must be settled on one or the other part of Gray's composite series.

We imagine that most zoologists would agree that the (or a) mystacine would be the logical choice to bear the name, as this was the zoological species before Gray. But before we can decide this issue, we should consider the implications of the two alternatives, and whether a previous author may have already settled the issue. There are two candidates: Dobson (1878), who, apparent-



ly inadvertently, attempted to fix the name *tuberculata* on the mystacine; and Thomas (1905), who deliberately chose the chalinolobe.

*Dobson's view.*—Dobson (1878:445), although not at all appreciating the nomenclatural conundrum (he in fact seems to have been unaware of Dieffenbach [1843]), comes near to settling the issue by referring to specimen “a” in his list of specimens of *Mystacina tuberculata* as the “type”. Were this one of the two specimens which Gray had mentioned in Dieffenbach (presumably “a” and “b” in Gray’s 1843 List), this would be a valid designation of a lectotype (ICZN 1985:Art. 74a), and the name would be fixed on the mystacine. It is unlikely, however, that Dobson’s “a” was one of Gray’s specimens. Dobson further states that “a” is the specimen figured in The Zoology of the Erebus & Terror. In the text accompanying this figure, Gray (1875:12b; see quotation above) does not identify the specimen figured, and certainly does not indicate that it is part of his original series. Because much, if not all, of Gray’s mystacine material had been turned over to Tomes for the latter’s use in writing his 1857 paper, and was seemingly not returned to the British Museum until 1905 (Hill & Daniel 1985), it may be that Dobson never viewed all of the British Museum specimens; and Gray was dead by the time Dobson’s catalogue appeared. Thus it is distinctly possible that Dobson’s statements are merely conjectural.

Hill & Daniel (1985) have looked carefully into the question of the identity and location of Gray’s specimens, examining the accession registers and specimen labels, but unfortunately they have not been able to ascertain with certainty which, if any, of the specimens currently present in the British Museum are Gray’s two bats, nor the identity of Dobson’s specimen “a”. They did, however, uncover evidence which appears to rule out Dobson’s specimen “a” from being one of Gray’s specimens, thus invalidating it as a lectotype. Thomas an-

notated specimen “a” in a copy of Dobson’s Catalogue at the British Museum with the following note: “Dr. F. J. Knox(P).—see Trans. N.Z. Inst. IV, p. 186, 1871” (Hill & Daniel 1985:286). If Thomas’s annotation is correct, then specimen “a” cannot be the type, as Knox (1872) states that he sent his shipment to the British Museum in or following July 1843, after Gray had already published in Dieffenbach. Perhaps Knox, writing in 1871, misrecalled what he had done almost 30 years earlier, in which case his specimen could have been before Gray in 1842, but there is no independent evidence of this, and Knox in his 1872 article refers to notes he had written in 1843 or earlier. Hill & Daniel (1985) have suggested that BM(NH) 44.10.29.7, sent by Knox, may be Dobson’s specimen “a”, but the date of accession (29 October 1844) lends no support to the notion that it might have been before Gray in 1842. The only thing about which we can be certain is that for Dobson’s “a” to be the type, one or more authorities must be mistaken about the identity of the specimen and/or the circumstances surrounding it.

Given that a number of errors in specimen identification and labeling have been discovered in Dobson’s Catalogue (Thomas 1905), we are reluctant to assume that Dobson was correct in this case, as no supporting evidence in Gray’s publications, the accession registers, specimen labels, or Thomas’s subsequent inquiries, is forthcoming; and, if Thomas’s annotation is correct, specimen “a” cannot be the type. Hill & Daniel (1985) consider other possibilities for the types, but do not seriously entertain that a specimen (“c” of Dobson’s Catalogue) from 1842 provided by Sir George Grey might be one of the type series (even though Gray [1843a] specifically mentions Grey’s collection), perhaps because it is not an adult and Hill & Daniel’s subspecies-level taxonomy depends heavily on size differences. The accession number of Grey’s specimen indicates that it had been at the Museum since at least February, although

Gray was unaware of it when writing the main body of his contribution to Dieffenbach (1843), which is dated “15th August, 1842” on page 181. We do not now know if Gray became aware of the specimen between this date and the publication of Dieffenbach, so that Grey’s specimen could have been one of the two specimens referred to on page 296. Sir George Grey also provided a second still-extant specimen (labeled “c\*”—Hill & Daniel 1985), catalogued in 1849; if this specimen was a duplicate from 1842 catalogued later, Grey may well have provided both of Gray’s bats.

W. D. L. Ride (in litt.) has suggested that Dobson’s (1878) specimen “b”, attributed by Dobson to Captain Belcher of the *Sulphur*, may have been one of Gray’s specimens. Although the *Sulphur* did not call at New Zealand, and Gray (1843b) does not refer to any mystacine specimens, Ride notes that Belcher was an avid collector, and could have received a specimen from his assistant surgeon Andrew Sinclair. Sinclair left the *Sulphur* voyage early to return to England via New Zealand, and collected at the Bay of Islands in 1841, where he may have obtained mystacine specimens. That Knox, Grey, and Belcher (through Sinclair) can all be argued to have provided Gray’s bats shows how difficult it is to identify their source or possible current whereabouts.

Hill & Daniel (1985) ultimately concluded that they could not identify the types, and based their conception of the nominate form on BM(NH) 44.10.29.7, a specimen which, if Knox is to be believed, could not possibly be a type.

A further problem with all of the candidates is that none has exact locality data. This is a serious shortcoming, because Hill & Daniel (1985) base their subspecific taxonomy of *M. tuberculata* on the supposition that the nominate form occurs in the Wellington area. As noted earlier, it is even conceivable that Gray’s specimens might have included *M. robusta*. At least some early

specimens, including perhaps Gray’s, came from the South Island and vicinity, and thus within or near the historic range of the now-extinct *M. robusta*; both Hutton and Knox mention a specimen (probably the same one) from as far south as Milford Sound, bats at least occasionally being caught in the rigging of ships plying the South Island coast. Ascribing authorship to Gray and fixing the name on the mystacine thus results not only in the name having a vague locality, but also injects some uncertainty into its specific identity.

Fixing *tuberculata* on the mystacine would give authorship of *Vespertilio tuberculatus* for the chalinolobe to J. R. Forster (1844), although there is some question as to whether *tuberculatus* might be preoccupied in *Vespertilio* by Gray’s usage of it in Dieffenbach (1843). The Code is not explicit on this point, but the implication of Article 51c(ii) seems to be that since the proposal of *Mystacina* was not conditional, then *tuberculatus* is not preoccupied. J. R. Forster is cited as the author (“Forster, 1844”) in Koopman’s authoritative list of 1993 (but not in Koopman’s 1994 monograph, prepared earlier than the 1993 list, where he attributes the names of both New Zealand bats to Gray, 1843, apparently accepting the judgments of Hill & Daniel [1985]).

In short, accepting Gray as the author and settling the name of the resulting composite on the mystacine leaves us without a type specimen or type locality, and thus also even without unequivocal correspondence of the name with the extant mystacine species, though it has a superficial appeal in that it would preserve one version of current usage and attribution for both the mystacine and chalinolobe.

*Thomas’s view.*—Of all authors who have considered the mystacine problem, Thomas (1905) came closest to understanding the situation. He realized that both New Zealand bats had been discussed in Dieffenbach (1843), but that only one species-group name had been proposed, so that the



name could apply to only one or the other. He apparently regarded the description of *Vespertilio tuberculatus* on page 181 of Dieffenbach as originating with Gray, and therefore that the same author's later description of *Mystacina tuberculata* on page 296 was invalidated by page priority. He thus settled what he took to be Gray's specific name on the chalinolobe. Thomas's claim to have acted as first reviser and settled the question is strengthened by his having clearly been the first to realize that a choice between two courses of action was necessary, and to have made one; and his mention of Forster's figure, and citation of Gray's name as "ex. Forst.", comes close to (although, because he did not use the word "type", not quite) designating a lectotype. It is clear that he intended to restrict application of *tuberculatus* to the chalinolobe, and may have done so according to the nomenclatural standards then prevailing, even if his actions are not conclusive under today's Code.

While appreciating Thomas's insight, we hasten to add that, unless we are willing to consider that an author (in this case Gray) may have misidentified a type species which he himself has authored in the very same publication (a possibility whose illogic makes us loath to contemplate it), Thomas's restriction leads necessarily to all of the unfortunate consequences enumerated above which flow from having the chalinolobe as the type species of *Mystacina*. Thomas overcame these difficulties, in part, by using *Mystacops* for the mystacine, which may have sufficed under nomenclatural rules as then understood; but, as we have already shown, under the current Code, *Mystacops* must always be an objective synonym of *Mystacina*, and thus the unpleasant consequences still follow.

What is to be done?

We believe the weight of the evidence indicates that the description of the chalinolobe on page 181 of Dieffenbach (1843),

and hence authorship of *Vespertilio tuberculatus*, should be attributed to George Forster. It is clear from the contents and format of Dieffenbach (1843) that Gray was attributing the species' name and description to another, and thus that "some other person is alone responsible both for the name and for satisfying the criteria of availability" (ICZN 1985:Art. 50a)—that other person being George Forster. Gray never subsequently explicitly attributed the name to himself. Attempts to attribute the conditions of availability to Gray by appealing to the contention that he was describing George's drawing fail on the ground that the description does not correspond to the drawing, and also run afoul of Article 50a's specific admonition that such questions of authorship are to be determined by the "contents of the publication", and not by reference to external evidence. We are not entirely alone in honoring George Forster: Sherborn (1931:6670) cites the name as "G. Forster in J. E. Gray in Dieffenbach, Trav. N. Z. II. 1843, 181." Dwyer (1962) also appears to accept George as author, for he attributes the name to G. Forster in his first mention of the chalinolobe (and elsewhere just to "Forster"). Having once settled authorship upon George Forster, all else follows unambiguously: all species-group names have a firm basis in either extant types (*robusta*, *aupourica*, *rhyacobia*) or well-established type localities (*tuberculatus*, *velutina*) which are in harmony with the current sub-specific and specific arrangement, insuring the nomenclatural stability of these names into the indefinite future; the names *Mystacina* and *Mystacinidae* continue in their familiar applications; and no changes of name are required in the genus *Chalinolobus*. The only drawback of this decision is that it requires use of the specific name *velutina* Hutton for the lesser mystacine, which has not been used since earlier in this century.

The other route, supposing Gray to be the author, makes us choose between Dobson and Thomas: it leads to a chain of uncertainties and difficulties, concerning the

specimens before Gray, and whether any of these are still extant; whether Dobson's supposed type was one of these specimens, and thus if he had fixed the specific name on the mystacine; whether Thomas's annotations to Dobson's catalogue are accurate; whether Knox in 1871 correctly recalled the circumstances of his shipment of specimens to the British Museum almost 30 years earlier; and whether Thomas validly settled *tuberculatus* on the chalinolobe. Although by judicious resolution of these several uncertainties we might retain *tuberculatus(a)* as the specific name of both extant New Zealand bats, we might also lose some type localities; upset the subspecific classification of *Mystacina*, even introducing uncertainty into its specific classification; make *Chalinolobus* an objective synonym of *Mystacina*; transfer the latter name to a segment of the Chiroptera phylogenetically distant from that to which the name has long applied; leave the mystacines without generic or family names, thus requiring the proposal of new names; and, unlike our proposed course of action, might well require exercise of the plenary power by the Commission. And, whatever resolution we might come to, it would be based on a series of doubtful inferences: a compounding of uncertainties, a multiplication of improbabilities. We thus prefer to resolve the initial uncertainty in favor of G. Forster, as we believe that this is not only correct and historically true, but will do the most to promote the stability and universality of nomenclature.

*Synonymy*.—Adopting the course here recommended leads to the following synonymies of the names concerned. For the chalinolobe, only the specific synonymy is given, as the generic synonymy would lead us far astray from New Zealand. For the mystacines, familial, generic, specific, and subspecific synonymies are given. They are complete, we believe, as regards synonyms and combinations, but only a few of the more salient citations to each name or combination are given. Further citations may be found in the references in Hill & Daniel

(1985), Daniel (1979, 1990), Hand et al. (1998), and Kirsch et al. (1998).

*Chalinolobus tuberculatus* (G. Forster)

*Vespertilio tuberculatus* G. Forster in Diefenbach, 1843:181. "Dusky Bay, New Zealand", in error; correctly given as "in estuario reginae Charlottae" (= Queen Charlotte's Sound, South Island, New Zealand) by J. R. Forster, 1844:63. Type lost (Whitehead 1969); drawing of type by George Forster in British Museum (Natural History).

*Mystacina tuberculata*.—Gray, 1843a:34 (part).

*Scotophilus tuberculatus*.—Tomes, 1857:135; Hutton, 1872.

*Chalinolobus tuberculatus*.—Peters, 1867:680; Dobson, 1878 (part); Thomas, 1905; Dwyer, 1962; Hill & Daniel, 1985.

*Miniopterus* [sic] *morio*.—Gray, 1875:12a (?part). Although Gray states "Inhab. Australia", Hill & Daniel (1985:288), following unpublished notes by Thomas, suggest that the specimen illustrated (as *Scotophilus morio*; see next entry) was from New Zealand.

*Scotophilus morio*.—Gray, 1875:plate 19, fig. 2 (?part). Placed in the genus *Miniopterus* [sic] in the text; supposed by Hill & Daniel (1985) to be of a specimen from New Zealand (see previous entry). The plate may have been prepared as early as 1844 (Tomes 1857), and thus represents Gray's earlier opinion concerning the species' generic position.

*Chalinolobus morio*.—Thomas, 1889:462 (part); Flower & Lydekker, 1891 (part).

*Chalinolobus tumorio* Flower & Lydekker, 1891:671 (part; apparently a lapsus for *Chalinolobus morio*, but perhaps arising from an incomplete striking of "tuberculatus", which was overwritten by "morio"; not an available name).

Mystacinidae Dobson

Mystacinae Dobson, 1875:349. Type *Mystacina* Gray. Proposed as a "Group" (=



tribe, and thus a family-group name [ICZN 1985:Art. 35a]).

Mystacopidae Miller, 1907:239. Type *Mystacops* Lydekker (a replacement name for *Mystacina* Gray).

Mystacinidae.—Simpson, 1945:60. First use with correct suffix (ICZN 1985:Art. 11f).

### *Mystacina* Gray

*Mystacina* Gray in Dieffenbach, 1843:296. Type *Vespertilio tuberculatus* G. Forster in Dieffenbach, 1843:181 sensu Gray in Dieffenbach, 1843:296 = *Mystacina velutina* Hutton, 1872.

*Mystacops* Lydekker in Flower & Lydekker, 1891:671. Replacement name for *Mystacina* Gray, erroneously thought by Lydekker to be homonymous with *Mystacinus* Boie, 1822. Type *Vespertilio tuberculatus* G. Forster in Dieffenbach, 1843:181 sensu Gray in Dieffenbach, 1843:296 = *Mystacina velutina* Hutton, 1872.

### *Mystacina velutina* Hutton

*Mystacina tuberculata*.—Gray in Dieffenbach, 1843:296; Gray, 1843a (part), 1843b, 1875; Tomes, 1857; Dobson, 1878; Hill & Daniel, 1985.

*Mystacina velutina* Hutton, 1872:186. “[T]he Hutt Valley, near Wellington”, North Island, and “Milford Sound, on the southwest coast of the South Island”, New Zealand. Lectotype herein designated to be the Colonial Museum specimen from the Hutt Valley (see text for the fate of this specimen).

*Mystacops velutinus*.—Thomas, 1905:423.  
*Mystacops tuberculatus*.—Miller, 1907:241.

*Mystacina tuberculata tuberculata*.—Dwyer, 1962:3.

### *Mystacina velutina velutina* Hutton

*Mystacina velutina velutina*, New combination.

### *Mystacina velutina aupourica* Hill & Daniel

*Mystacina tuberculata aupourica* Hill & Daniel, 1985:294. “Omahuta Kauri Sanctuary, Northland, North Island, New Zealand”. Type Auckland Institute and Museum (AIM) M309.

*Mystacina velutina aupourica*, New combination.

### *Mystacina velutina rhyacobia* Hill & Daniel

*Mystacina tuberculata rhyacobia* Hill & Daniel, 1985:295. “Te Rimu area, upper Waimarino River, Kaimanawa Forest Park, SE of Lake Taupo, central North Island, New Zealand”. Type AIM M304.

*Mystacina velutina rhyacobia*, New combination.

### *Mystacina robusta* Dwyer

*Mystacina tuberculata robusta* Dwyer, 1962:3. “Big South Cape Island”, Stewart Island region, New Zealand. Type Dominion Museum 1083. Daniel, 1979.

*Mystacina robusta*.—Hill & Daniel, 1985:297; Daniel, 1990.

### Acknowledgments

We wish to express our thanks to the authorities of the British Museum (Natural History) for facilitating inspection of George Forster’s drawing, granting permission to reproduce it, and discussing Forster’s work, especially to A. Datta, V. Skeet, and A. Wheeler; B. Williams (Field Museum of Natural History) for providing access to earlier literature and assistance in dating it; C. Paulin (National Museum, Wellington) for information about specimens in the Colonial Museum; W. D. L. Ride and P. Tubbs (ICZN) for advice concerning the fourth edition of the Code; D. Lee and H. Spencer for reminding us of Andrews (1986); T. Griffiths for providing copies of literature; W. Feeny and D. Lintner for reproducing the figures; M. Clayton for nau-

tical advice; T. Griffiths and L. Ruedas for comments on the manuscript; and especially to W. D. L. Ride for extensive discussions.

Late in the preparation of the manuscript we became aware that H. Spencer and D. Lee (Otago) were pursuing a parallel investigation of the nomenclature of New Zealand's bats. We are most grateful to them for sharing their views with us, and for much discussion of the issues involved. We are encouraged that our independent analyses agree on many points, but regret that certain points of difference remain.

Although as yet unpublished, Spencer and Lee are making an application to the International Commission on Zoological Nomenclature (Case No. 3095 "*Mystacina* Gray, 1843, *Chalinolobus* Peters, 1866, *M. tuberculata* Gray, 1843 [currently *C. tuberculatus*] [Mammalia, Chiroptera]: proposed conservation of usage." BZN 55: 205). Note that Case No. 3095 does not support the arguments and resolution here proposed. Also, an application means (under Article 80) that current usage is to be maintained until a ruling is made.

### Literature Cited

- Andrews, J. R. H. 1986. The southern ark: zoological discovery in New Zealand 1769–1900. Century Hutchinson New Zealand Limited, Auckland, 237 pp.
- Boie, F. 1822. Ueber Classification, insonderheit der europaischen Vogel.—*Isis* 1822:545–564.
- British Museum (Natural History). 1903–1915. Catalogue of the books, manuscripts, maps and drawings in the British Museum (Natural History). Five volumes. British Museum (Natural History), London, 2403 pp.
- Daniel, M. J. 1979. The New Zealand short-tailed bat, *Mystacina tuberculata*; a review of present knowledge.—*New Zealand Journal of Zoology* 6:357–370.
- . 1990. Order Chiroptera. Pp. 114–137 in C. M. King, ed., *The handbook of New Zealand mammals*. Oxford University Press, Auckland, 600 pp.
- Dieffenbach, E. 1843. *Travels in New Zealand; with contributions to the geography, geology, botany, and natural history of that country*, vol. 2. John Murray, London, 396 pp.
- Diment, J. A., & A. Wheeler. 1984. Catalogue of the natural history manuscripts and letters by Daniel Solander (1733–1782), or attributed to him, in British collections.—*Archives of Natural History* 11:457–488.
- Dobson, G. E. 1875. Conspectus of the suborders, families and genera of *Chiroptera* arranged according to their natural affinities.—*Annals and Magazine of Natural History* 4th Series, 16:345–357.
- . 1878. Catalogue of the Chiroptera in the collection of the British Museum. British Museum, London, 567 pp.
- Dwyer, P. D. 1962. Studies on two New Zealand bats. *Zoology Publications from Victoria University of Wellington* 28:1–28.
- Erxleben, J. C. P. 1777. *Systema regni animalis per classes, ordines, genera, species, varietates cum synonymia et historia animalium. Classis I Mammalia*. Weygand, Leipzig, 636 pp.
- Flower, W. H., & R. Lydekker. 1891. An introduction to the study of mammals living and extinct. Adam and Charles Black, London, 763 pp.
- Forster, G. 1777. A voyage round the world in His Britannic Majesty's sloop, Resolution, commanded by Capt. James Cook, during the years 1772, 3, 4, and 5, vol. 1. B. White, London, 602 pp.
- Forster, J. R. 1778. Observations made during a voyage round the world. G. Robinson, London. Reprinted 1996 by University of Hawaii Press, Honolulu, 446 pp.
- . 1844. *Descriptiones animalium quae in itinere ad Maris Australis Terras per annos 1772 1773 et 1774 suscepto*. Officina Academica, Berlin, 424 pp.
- Gray, J. E. 1843a. List of the specimens of Mammalia in the collection of the British Museum. British Museum, London, 216 pp.
- . 1843b. Mammalia. Pp. 7–36 in R. B. Hinds, ed., *The zoology of the voyage of H.M.S. Sulphur, under the command of Captain Sir Edward Belcher, R.N., C.B., F.R.G.S., etc. during the years 1836–42*. Parts 1 and 2. Smith, Elder and Co., London, 36 pp.
- . 1875. Mammalia. II.—Miscellanea. Pp. 12a–12d in J. Richardson & J. E. Gray, eds., *The zoology of the voyage of H.M.S. Erebus & Terror, under the command of Captain Sir James Clark Ross, R.N., F.R.S., during the years 1839 to 1843*, vol. I. Mammalia, birds. E. W. Janson, London, 39 + 53 pp.
- Günther, A. 1875. A list of the saurians of Australia and New Zealand. Pp. 9–19 in J. Richardson & J. E. Gray, eds., *The zoology of the voyage of H.M.S. Erebus & Terror, under the command of Captain Sir James Clark Ross, R.N., F.R.S., during the years 1839 to 1843*, vol. II. Reptiles, fishes, Crustacea, insects, Mollusca. E. W. Janson, London, 19 + 139 + 5 + 51 + 7 pp.



- Hand, S. J., P. Murray, D. Megirian, M. Archer, & H. Godthelp. 1998. Mystacinid bats from the Australian Tertiary.—*Journal of Paleontology* 72: 538–545.
- Hill, J. E., & M. J. Daniel. 1985. Systematics of the New Zealand short-tailed bat *Mystacina* Gray, 1843 (Chiroptera: Mystacinidae).—*Bulletin of the British Museum Natural History (Zoology)* 48:279–300.
- Hoare, M. E. 1982. The Resolution journal of Johann Reinhold Forster 1772–1775. Four volumes. The Hakluyt Society, London, 831 pp.
- Hutton, F. W. 1872. On the bats of New Zealand.—*Transactions and Proceedings of the New Zealand Institute* 4:184–186.
- International Commission on Zoological Nomenclature. 1985. International Code of Zoological Nomenclature, 3rd edition. University of California Press, Berkeley, 338 pp.
- . 1999. International Code of Zoological Nomenclature, 4th edition. (in press).
- Kirsch, J. A. W., J. M. Hutcheon, D. G. P. Byrnes, & B. D. Lloyd. 1998. Affinities and historical zoogeography of the New Zealand short-tailed bat, *Mystacina tuberculata* Gray 1843, inferred from DNA-hybridization comparisons.—*Journal of Mammalian Evolution* 5:33–64.
- Knox, F. J. 1872. Observations on New Zealand bats.—*Transactions and Proceedings of the New Zealand Institute* 4:186–188.
- Koopman, K. F. 1993. Order Chiroptera. Pp. 137–241 in D. E. Wilson and D. M. Reeder, eds., *Mammal species of the world* [:] a taxonomic and geographic reference, 2nd edition. Smithsonian Institution Press, Washington. 1206 pp.
- . 1994. Chiroptera: systematics. *Handbook of Zoology, VIII Mammalia*, 60. Walter de Gruyter, Berlin, 217 pp.
- Linnaeus, C. 1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species cum characteribus, differentiis, synonymis, locis*. Editio decima reformata, vol. 1. Laurentii Salvii, Stockholm, 824 pp.
- . 1766. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Editio duodecima, reformata, vol. 1, part 1. Laurentii Salvii, Stockholm, 532 pp.
- Lysaght, A. 1959. Some eighteenth century bird paintings in the library of Sir Joseph Banks (1743–1820).—*Bulletin of the British Museum Natural History (Historical Series)* 1:253–371.
- Mayr, E. 1969. *Principles of systematic zoology*. McGraw Hill, New York. 428 pp.
- Miller, G. S. 1907. The families and genera of bats.—*Bulletin of the United States National Museum* 57:1–282.
- Minelli, A., & W. D. L. Ride. 1997. Fourth edition of the International Code of Zoological Nomenclature: notice of new provisions.—*Bulletin of Zoological Nomenclature* 54:216–218.
- Peters, W. 1867. *Fernere Mittheilungen zur Kenntniss der Flederthiere, namentlich über Arten des Leidener und Britischen Museums*.—*Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin* 1866:672–681.
- Pierson, E. D., V. M. Sarich, J. M. Lowenstein, M. J. Daniel, & W. E. Rainey. 1986. A molecular link between the bats of New Zealand and South America.—*Nature* 323:60–63.
- Polack, J. S. 1838. *New Zealand: being a narrative of travels and adventures during a residence in that country between the years 1831 and 1837*. Two volumes. Richard Bentley, London.
- Quammen, D. 1996. *The song of the dodo: island biogeography in an age of extinctions*. Simon & Schuster, New York. 702 pp.
- Sherborn, C. D. 1931. *Index animalium sive index nominum quae ab A.D. MDCCLVIII generibus et speciebus animalium imposita sunt. Sectio secunda, part XXVI*. British Museum (Natural History), London, pp. 6359–6582.
- . 1932. *Index animalium sive index nominum quae ab A.D. MDCCLVIII generibus et speciebus animalium imposita sunt. Sectio secunda, part XXIX*. British Museum (Natural History), London, pp. 1–208.
- Simmons, N. B., & J. H. Geisler. 1998. Phylogenetic relationships of *Icaryonycteris*, *Archaeonycteris*, *Hassianycteris*, and *Palaeochiropteryx* to extant bat lineages, with comments on the evolution of echolocation and foraging strategies in Microchiroptera.—*Bulletin of the American Museum of Natural History* 235:1–182.
- Simpson, G. G. 1945. *The principles of classification and a classification of mammals*.—*Bulletin of the American Museum of Natural History* 85: 1–350.
- Thomas, O. 1889. Note on the nomenclature of the short-eared New-Zealand bat.—*Annals and Magazine of Natural History* 6th Series, 4:462.
- . 1905. On some Australasian mammals.—*Annals and Magazine of Natural History* 7th Series, 16:422–428.
- Tomes, R. F. 1857. On two species of bats inhabiting New Zealand.—*Proceedings of the Zoological Society of London* 1857:233–244.
- Whitehead, P. J. P. 1969. Zoological specimens from Captain Cook's voyages.—*Journal of the Society for the Bibliography of Natural History* 5: 161–201.
- . 1978. The Forster collection of zoological drawings in the British Museum (Natural History).—*Bulletin of the British Museum Natural History (Historical Series)* 6:25–47.
- Zimmer, J. T. 1926. *Catalogue of the Edward E. Ayer ornithological library*.—*Field Museum of Natural History Zoological Series* 16:1–706.